

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 (canceled)

2. (currently amended) An apparatus according to Claim 18 ~~[[1]]~~ wherein said sequencer queues said work units ~~packaged individual page data~~ to be communicated to said RIPs ~~raster image processors~~ and further wherein individual ones of said raster image processors draw from said queued work units ~~data as processing of data~~ related to an individual page, ~~is completed and~~ generated data signals are communicated over said one or more RIP-to-head driver networks to a print head driver.

3. (currently amended) An apparatus according to Claim 17 ~~[[1]]~~ wherein each of said RIPs ~~raster image processors~~ converts said work units ~~[[data]]~~ from a form communicated as a print data stream to ~~a form to be communicated as~~ data signals over said one or more RIP-to-head driver networks to a print head driver.

4. (currently amended) An apparatus according to Claim 3 wherein each of said RIPs ~~raster image processors~~ converts data from a form communicated as a print data stream into a variable number of portions depending upon whether an individual page is to be blank or to be printed with a single color or to be printed with multiple colors.

5 (canceled)

6. (currently amended) A method comprising the steps of:

~~changing the number of raster image processors in a pipeline of elements including a sequencer, said raster image processors and print head drivers, wherein said sequencer remains unchanged by additions and removals of connected and disconnected said raster image processors;~~

receiving at a computer a print data stream from a print server and parsing the stream into local and global portions;

packaging together parsed local and global print stream data portions;

queuing packaged print stream data portions in said computer sequencer;

communicating queued packaged print stream data portions directly over a network to a plurality of personal computers operating as raster image processors (RIPs);

processing a plurality of communicated packaged print stream data portions in parallel in said plurality of personal computers to generate print head driving data signals ~~from said print head drivers~~; and

communicating the generated print head driving data signals from said said plurality of personal computers to one or more print head driver computers, said print head driver computers driving ~~drivers to a printer and to the~~ print heads of a [[said]] printer.

7. (original) A method according to Claim 6 wherein said step of packaging print stream data portions comprises packaging portions applicable to individual pages.

8. (original) A method according to Claim 6 wherein said step of processing comprises generating bit map data signals.

9. (currently amended) A computer program product comprising a computer readable medium with program instructions stored thereon and effective when distributed amongst a plurality of computer systems and executed by the ~~[[a]]~~ computer systems ~~[[system]]~~ to cause the computer systems ~~[[system]]~~ to:

~~configure a pipeline of elements responsive to the number of raster image processors in said pipeline of elements, said pipeline of elements including a sequencer, said raster image processors and print head drivers, wherein the number of said raster image processors may be changed and said pipeline of elements reconfigured for the changed number, said sequencer remaining unchanged by changing the number of said raster image processors;~~

receive a print data stream at a first computer from a print server and in the first computer parse the stream into local and global portions;

package together parsed local and global print stream data portions;

queue in the first computer packaged print stream data portions;

communicate queued packaged print stream data portions directly to a plurality of raster image processors (RIPs);

process in the RIPs a plurality of communicated packaged print stream data portions in parallel to generate print head driving data signals; and

communicate the generated print head driving data signals from the RIPs to one or more print driver computers driving to a printer and to the print heads of a ~~[[said]]~~ printer.

10 – 13 (canceled).

14. (new) An apparatus comprising:

a pipeline of processors processing print control data and having:

one processor being a sequencer receiving a print data stream at an input port, said sequencer monitoring data flows among the pipelined processors and parsing a print data stream into local data portions related to individual pages and

global state data portions related to characteristics shared across a plurality of pages, said sequencer packaging together parsed page local and global state data portions as work units;

a plurality of raster image processors (RIPs) directly connected to said sequencer on one or more sequencer-to-page networks with said sequencer, each RIP receiving work units from said sequencer, said raster image processors processing work units in parallel and generating data signals; and

one or more of said processors providing a plurality of print head drivers communicating over one or more RIP-to-head driver networks with said plurality of RIPs as directed by said sequencer, said sequencer synchronizing print jobs traversing said pipeline, each of said print head drivers receiving control data signal controlling application of colorant to a sheet by a print head;

wherein said one or more sequencer-to-page networks and said one or more RIP-to-head driver networks are bidirectional networks.

15. (new) An apparatus according to Claim 14, wherein a plurality of said processors in said pipeline are stand alone computers.

16. (new) An apparatus according to Claim 15, wherein said plurality of processors includes a plurality of personal computers.

17. (new) An apparatus according to Claim 16, wherein said plurality of RIPs includes a plurality of personal computers.

18. (new) An apparatus according to Claim 17, wherein said sequencer maintains a queue of said work units, coordinates print jobs in said pipeline and is a higher performance computer than said RIPs, said sequencer selectively acting as one or more of said RIPs, said RIPs requesting work when ready, accessing said queue and obtaining one or more work unit for processing.

19. (new) An apparatus according to Claim 16, wherein each of said plurality of RIPs is a personal computer, the number of RIPs being adjusted by adding and removing RIP personal computers to/from said one or more sequencer-to-page networks and said one or more RIP-to-head driver networks.

20. (new) An apparatus comprising:

a pipeline of computers processing print control data and connected between a print server and a printer and processing print control data from said print server, and said pipeline of computers having:

a sequencer computer receiving a print data stream at an input port, said sequencer computer monitoring data flows among the pipelined computer and parsing a print data stream into local data portions related to individual pages and global state data portions related to characteristics shared across a plurality of pages, said sequencer packaging together parsed page local and global state data portions as work units;

a plurality of raster image processors (RIPs) directly connected to said sequencer computer on one or more sequencer-to-page networks with said sequencer computer, wherein said plurality of RIPs is a plurality of personal computers each receiving work units from said sequencer, said plurality of RIPs processing work units in parallel and generating data signals; and

one or more print head driver computer communicating over one or more RIP-to-head driver networks with said plurality of RIPs as directed by said sequencer computer, said sequencer computer synchronizing print jobs traversing said pipeline, each of said print head drivers receiving control data signal controlling application of colorant to a sheet by a print head;

wherein a plurality of said computers are stand alone computers and said on one or more sequencer-to-page networks and said one or more RIP-to-head driver networks are bidirectional networks.

21. (new) An apparatus according to Claim 20, wherein said plurality of computers comprises a plurality of personal computers.

22. (new) An apparatus according to Claim 21, wherein said sequencer computer maintains a queue of said work units, coordinates print jobs in said pipeline and is a higher performance computer than said RIPs, said RIPs requesting work when ready, accessing said queue and obtaining one or more work unit for processing.

23. (new) An apparatus according to Claim 21, wherein each of said plurality of RIPs is a personal computer, the number of RIPs being adjusted by adding and removing RIP personal computers to/from said one or more sequencer-to-page networks and said one or more RIP-to-head driver networks.

24. (new) An apparatus according to Claim 21, wherein said sequencer selectively acting as one or more RIP.